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Conference Abstract

The effects of changes in composition and state of the lipids on erythrocytes' oxygen-transport function in pathological conditions associated with the development of hypoxia

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Abstract

Hypoxia currently plays a key role in the pathogenesis and pathophysiology of the most cardiovascular diseases.

A major role in reducing the efficiency of erythrocytes' oxygen transport is assigned to the impairment of structure and function of blood vessels endothelium. The role of the erythrocytes themselves in the development of cardiovascular diseases remains understudied.

Oxygen-transport function of peripheral blood erythrocytes depends on many factors, among which of great importance is cell membrane condition, morphology of erythrocytes and conformation change in haemoglobin heamatoporphyrin.

One of the important and not thoroughly studied is the issue of the interrelation between composition and state of membrane's lipid bilayer and changes of erythrocytes' morphometric parameters with the conformation characteristics of haemoglobin haematoporphyrin in the development of ischemic heart

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We have found that patients with cardiac angina have a redistribution of charged fractions of phospholipids in favour of the neutral ones, located at the outer side of the plasma membrane and the negatively charged phosphatidylserine that is part of the inner surface of the membrane. There is an increasing number of phospholipids' lizoforms and free fatty acids. In all fractions of phospholipids studied, there was an increase in saturation coefficient, which indicates to a decreased content of unsaturated and increased content of saturated fatty acids.

Erythrocytes undergo the intensive processes of lipid peroxidation. More pronounced changes are observed in patients with angina on the background of the primary arterial hypertension.

Taking into account the changes in lipid bilayer, the morphology of the cell itself, as well as conformational disorders of erythrocytes' haemoglobin haematoporphyrin it is possible to tell about the existence of a single, unifying molecular and cellular levels, mechanism that regulates the transport of oxygen.

Detected changes in CHD patients' erythrocytes impair the oxygen transport capacity of haemoglobin and the latter will aggravate the process of hypoxia on the background of underlying heart ischemia.

Keywords

Hypoxia, pathogenesis, pathophysiology, cardiovascular diseases, erythrocytes' oxygen transport, haemoglobin heamatoporphyrin, cardiac angina, heart ischemia

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